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PAUL A. SAMUELSON AND MONETARY THEORY

by

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Paul A. Samuelson and Monetary Theory*

1. Monetary theory has not been among Paul Samuelson's major concerns, yet here too he has made important contributions. These began with his "Note on the Demand for Money" appended to the chapter on "The Pure Theory of Consumer's Behavior" in his Foundations of Economic Analysis (1947, pp. 117-24). As in many of his other contributions to economic theory, Samuelson instructively relates his analysis to the earlier literature - in this case Walras' much neglected microeconomic analysis of the demand for money. For though Walras' notion of the encaisse désirée had earned him a place in the history of monetary theory as a co-discoverer (together with Marshall and Wicksell) of the cash-balance approach to the quantity theory, the utility analysis from which Walras had derived his encaisse désirée in the fourth (1900) edition of his Eléments d'économie politique pure received little attention in the continental literature and was entirely ignored in the English one.[1] And understandably so: for this analysis is as cumbersome and mechanical as it is obscure.

From this oblivion, Samuelson rescued Walras' analysis by cutting through its obscurity and deriving the demand for

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* This is the chapter on Monetary Theory of a forthcoming book edited by Robert Solow: Paul A. Samuelson and Modern Economics.

real money balances from the utility function

$$U = U(x_1, \ldots, x_n, p_m M, p_1, \ldots, p_n),$$

where the x_i represent commodities, p_i their prices, M the nominal quantity of money, and p_m its price in terms of some numéraire - and where U( ) is homogeneous of degree zero in all prices, including that of money. In this way his function retained the spirit (but avoided the complexities) of Walras' analysis, which had assumed that the individual derived utility not from some overall measure of real money balances, but from a vector representing the purchasing power of money over each of the "services of availability" of the individual commodities in the economy. Samuelson's exposition was also in Walras' spirit in explicitly including the imputed interest-cost of money holdings as an expenditure item in the individual's budget restraint. From this restraint and the utility function, Samuelson then proceeded to derive demand function for all goods, including nominal money holdings, homogeneous of degree zero in all prices (including that of money) and income. Alternatively, the demand for nominal money holdings was shown to be homogeneous of degree one in all prices (excluding its own) and income.

The Foundations reveals other influences on Samuelson's thinking about monetary economics. Thus in more then one of his reminiscences /1969, III, 196, p. 683; 1972, IV, 278, pp. 884-86/, Paul has referred to his undergraduate studies

in the early 1930's at the University of Chicago, where he was exposed to the teachings of Frank Knight, Jacob Viner, and Henry Simons; and in a much appreciated personal inscription to one of the volumes of his Collected Scientific Papers, Paul concluded with the sentiment that we both think that "Chicago is a good place to have come from". It seems to me that this Chicago influence is also reflected in his "Note on Money". For in it, at the height of the Keynesian influence, Samuelson rejected a monetary theory of the rate of interest. Thus, drawing support from Knight, Paul deftly refuted Hicks' contention that in a world in which there were perfectly liquid bonds, the rate of interest would be zero by observing that in such a world it would not be interest that would disappear, but money as a medium of exchange, which would be replaced by perfectly liquid interest-bearing bonds (Foundations, pp. 123-24). And this "real" approach to the rate of interest has characterized his subsequent discussions of the subject as well.

2. More than twenty years were to pass before Samuelson returned to questions of monetary theory. This occurred in his well-known article on "What Classical and Neoclassical Monetary Theory Really Was" /1968, III, 176/, which also discussed my treatment of this question in Money, Interest, and Prices (1965, chap. 8). In this article Samuelson improved and elaborated on the exposition of the Foundations in several

ways, one of which was to make use of a budget restraint that also included the nominal value of wealth (including money balances). From this restraint and the utility function (which was essentially the same as that of the Foundations) were then derived demand equations for all goods (including money balances deflated by the individual commodity prices) which were homogeneous of degree zero in all prices (including prices of factors of production) and the nominal value of wealth (including nominal money balances). These equations determined the equilibrium values of the real variables in the system - relative prices and real money balances. Supplementing this set of equations with one fixing the nominal supply of money then determined equilibrium absolute prices. From such a system the classical neutrality of money was readily established.

Samuelson contrasted this valid dichotomy between the determination of relative and absolute prices, with the invalid one which posited a set of demand functions for commodities dependent only on - and determining - relative prices, which was supplemented by a quantity-theory equation that then determined the absolute price level. And he went on to express the view that though there were examples of economists who had presented such a dichotomy, the "best neoclassical writers did perceive at the intuitive level the intrinsic content of the /valid/ dichotomy" (1968, III, 176, p. 534, italics in original).

As Paul himself indicated, there was no difference between us on the substantive aspects of these dichotomy-cum-neutrality issues. There were, however, differences with respect to the doctrinal aspects, and in a short note on this paper (Patinkin 1972) I explained why I did not accept his view of these aspects. From Paul's reply /1971, IV, 265/, I have the impression that, while the extent of our disagreement was diminished by this exchange, some differences of opinion still remained. I mention this exchange because it leads me to a general observation. Anyone who deals with the history of ideas must take account of the fact that the individuals whose writings he is studying did not generally see the full implications of everything they wrote. At the same time, and as presumptuous as it may be, anyone who deals with the history of ideas tends to project from the workings of his own mind in his attempt to understand how the minds of others have worked. And so I feel that at least part of the aforementioned remaining differences of opinion arise from the fact that Paul Samuelson's extraordinarily quick and encompassing mind makes him less inclined to believe that others did not see what seems so obvious to him.

Paul's 1968 article represents other characteristics of his work. Thus he carries out his analysis in terms of a stationary state, and is thus able to generalize the Archibald-Lipsey result about the irrelevance of the way a monetary in-

crease is initially distributed in the economy. He also describes the "qualitative" aspect of money: the fact that it enables production and exchange to be carried out far more efficiently than in the case of barter /1968, III, 176, p. 531/. At the same time, unlike some recent literature, he is willing to take the existence of a money serving this purpose as given, and feels no necessity to attempt a rigorous demonstration of how one of the goods in the economy eventually evolves and becomes money - a pragmatic approach with which I have the fullest sympathy . Finally, in keeping with his basic concern with welfare economies, Paul addresses himself to the question (and does so even more forcefully in a subsequent note /1969, III, 177/) of whether a laissez-faire economy will generate an amount of money (in real terms) which is optimum from the viewpoint of society. And like others before him, he neatly shows that as a result of the discrepancy between the private cost of holding money (viz., interest foregone) and the social cost (viz., zero), the real quantity of money in a laissez-faire economy with stable prices is sub-optimal.

3. I think it is fair to say that Samuelson originally conceived his profound and justly celebrated article on "An Exact Consumption-Loan Model of Interest with or without the Social Contrivance of Money" /1958,I, 21/ as being primarily a contribution not to monetary economics, but to the theory

of interest and to welfare economics - and it is accordingly under these headings (as well as that of general-equilibrium theory) that this article is mainly discussed in this volume. Nevertheless, the overlapping-generations model presented in this article has had a seminal influence on the development of monetary theory during the past decade and continues to be a major vehicle for work in this field.[2)]

My feeling, however, is that on the one hand this article makes a greater contribution to monetary economics than originally indicated by Samuelson; on the other, while recognizing the importance of the subsequent contributions to monetary economics that have stemmed from this article, I share the reservations of James Tobin (1980) and others about the attempt (well-illustrated by several of the papers in Kareken and Wallace /1980/) to present the overlapping-generations model as the basic model for the analysis of monetary phenomena.

By the first of these points I have in mind the fact that in the article itself Samuelson refers to money only as a store of value. But as Cass and Yaari (1966, pp. 465-66) later pointed out, money in this model also obviates the need for a "double coincidence of wants": in particular, it enables transactions between the younger and older generations, even though the latter cannot provide the commodities-in-subsequent-old-age which the former desire in exchange for the commodities they now provide. In this sense, then, money also serves as a medium of exchange in this model.

My reservations about the prominence given to this model in recent work in monetary theory begin with the familiar criticism that despite the fact just mentioned, this model does not capture the essence of the function of money as a medium of exchange in the real world. For this function is primarily not to make possible transactions that would otherwise be technically impossible (i.e., not to create a market that would otherwise not exist), but (as Wicksell so aptly described it many years ago [Lectures I, pp. 63-65; II, pp. 15-18]) to carry out in a more efficient way transactions that could in principle be carried out at much greater cost in terms of time and effort by a mixture of direct and indirect barter. And it would be an evasion of the issue to say that such costs also exist in the overlapping-generations model, except that they are infinite there. Furthermore, though the model could undoubtedly be generalized to deal with money as a medium of exchange in the fullest sense of the term, one of its claimed advantages - namely, that it provides a rigorous explanation of the positive value of money - would then no longer be unique to it. I shall return to this point in a moment.

Secondly, many of the properties of what is called money in this model simply reflect the fact that it is the only asset that can be carried over from one period to another. This is the reason there is a demand for it even though it provides no direct utility - just as in the traditional Fisherine two-period model individuals have a demand for bonds (the only instrument by means of which they can carry out the lending that enables them to transfer

purchasing power to the second period) even though such bonds have no direct utility. Similarly, the reason that the socially-optimum real quantity of money in this model is achieved with a constant nominal quantity of money and a price level declining at the same rate that the economy is growing is not because individuals are then (in Samuelson's words) costlessly "satiated with cash" [1968, III, 176, p. 538], but that the real rate of interest then equals the rate of growth of the economy, which is the condition for generating the socially-optimum rate of savings - and money is the only asset in which savings can be held. Most important of all in this context is the fact (essentially noted already by Cass and Yaari [1966]; cf. also Samuelson [1959, I, 22, p. 237]) that one could just as well carry out the analysis of the overlapping-generations model on the assumption that the only durable asset consists of interest-bearing government bonds. The social optimum would then be achieved when this rate of interest equals the rate of growth of the economy. Such a model could also be regarded as an illustration of Samuelson's conclusion in the Foundations that in a world with perfectly liquid bonds it would not be the rate of interest that would disappear, but money (above, p. 2).

Thirdly, and related to my first two reservations, the fact that there is only one durable asset also means that the overlapping-generations model cannot deal with one of the basic questions of monetary theory: namely, why individuals in the real world choose to hold money when they can instead hold assets which yield a higher market rate of return. Furthermore, I would conjecture that any generalization

of the model to deal with this question will have to resort to the kind of approaches that have been used in the past for this purpose: namely, to attribute to money not only the function of a store of value that can be carried over from one period to another, but also the function of providing (in one sense or another) a "liquidity service" during any given period.[3)] And as already indicated, once such a generalization is carried out, the overlapping-generations model loses one of its advantages: in particular, its infinite time horizon is no longer necessary as a means of avoiding what Cass and Shell (1980, p. 252) have denoted as the "hot potato" problem; for even in a finite-time-horizon model, in which by definition there is no demand for money in the last period so that its value then is zero, there will in earlier periods be a positive demand (and hence positive value) for money because of the liquidity-services that it then provides - just as there is a positive demand for a machine that is productive for a finite period of time, even though it may depreciate in value to zero by the end of the period.

Since Samuelson himself has not contributed to the literature in monetary economics based on his 1958 overlapping-generations model, I shall suffice here with these observations. Let me however say that though we should probably not draw any inferences from the fact that he has not so contributed, it may be significant that when in 1968 Samuelson explicitly analyzed the question of the socially-optimum quantity of money (see pp. 5-6 above), he did not include the discussion at the end of his 1958 article in his list of earlier discussions of the question /~1968, III, 176, p. 538, n. 7; 1968, III, 177, p. 544, n. 3~/. Is this Paul's

revealed preference for the way the relation of this article to monetary economics should be regarded?[4)]

4. In one of his more popular writings [1967, III, 178, pp. 550-52], Paul Samuelson has described how he at one time believed that money was not important, and how he subsequently changed his mind. It is interesting to trace the way this shift has reflected itself over the past thirty-and-more-years in one of Paul's major contributions to modern economics, or, more specifically, to modern public education in economics all over the world: namely, the eleven (so far!) editions of his Economics: An Introductory Analysis [5)]. But before undertaking this task let me digress briefly on two pedagogical diagrams for which this book is noted.

The first is the circular-flow diagram, with money and goods flowing in oposite directions, which instructively illustrates the way the price-system of a market economy solves the basic problems of "what, how, and for whom to produce". Here again is a reflection of Paul's studies at Chicago: for this is basically the famous "wheel-of-wealth" diagram in Frank Knight's Economic Organization (1933, p. 61) on which all students at Chicago were brought up. Indeed, both in the book (1951, p. 14, fn. 1) and in personal correspondence Paul has indicated this origin of the diagram.

The second diagram appears in the exposition of macro-economic theory: namely, the "diagonal-cross" diagram (viz, the aggregate demand curve intersecting with the 45° line from the origin) by means of which generations of economic students have learned the basics of Keynesian analysis. I

am not sure that Samuelson's Economics was the first introductory textbook to have made use of this diagram, though it may well have been. What is however clear is that such a diagram made its first appearance in the literature in Paul's 1939 paper on "A Synthesis of the Principles of Acceleration and the Multiplier" /II, 83, pp. 1111-12/. Thus, in any event, the credit for this invaluable expository device belongs to him.[6)]

To return to my main theme, let me begin by saying that I shall trace the aforementioned shift by means of two indicators: the treatment of the quantity theory and the treatment of the role of monetary policy. In the first (1948) edition of Economics, the second half of the chapter on "Prices, Money, and Interest Rates" is largely devoted to an exposition of the quantity theory. The theory is presented as one which claims that prices are proportional to the quantity of money. A footnote alerts the reader to one of the fundamental reservations that has over the years been made with respect to this theory: namely, "that the quantity theory does not get down to the fundamental reasons why money is being created at the rate it is being created. The true direction of causation is by no means in the one-way-direction from M to P" (1948, p. 291, n. 2; see also p. 292, n. 2). This is followed by a discussion in the text of two "inadequacies of the quantity theory"; namely, (1) that prices are not proportional to total spending except in conditions of full employment and (2) that total spending is not proportional to the stock of money. An alternative formulation of this second inadequacy is that "the velocity of circulation is not even approximately constant"(1948,

p. 294, italics in original). Correspondingly the equation of exchange MV = PQ is dismissed as a sterile truism which in effect defines the velocity of circulation, V. The instability of V together with the insensitivity of investment to changes in the rate of interest then lead to the conclusion that monetary policy is an inadequate means of dealing with problems of deflation and unemployment ("you can lead a horse to water, but you can't make him drink"), with a supporting reference given to the Great Depression of the 1930s. At the same time Paul states that monetary policy may be more useful as a means of dealing with inflation (1948, pp. 294, 353-54).

In the second (1951) edition much the same analysis is presented, but the discussion of the quantity theory is relegated to an appendix to the chapter on "Money, Interest and Income" (1951, pp. 346 ff.). This appendix also includes a more detailed analysis of the instability of the velocity of circulation, in terms of the shift from "active" into "inactive" balances as the rate of interest declines.

The discussion of the quantity theory of money remains in an appendix in the third edition (1955, pp. 292 ff.). But the preface to this edition (p. vi) refers to a theme that is to become a standard feature of all subsequent editions: the "neoclassical synthesis", in which inter alia there is a role to be played by monetary policy as well as fiscal policy, though reliance must primarily be placed on the latter (1955, pp. 317, 360). It is also noteworthy that this increased emphasis on monetary policy is implicitly related to developments in the U.S. economy in the early 1950s (1955, pp. 315-316).

In the fourth edition (1958) the quantity theory is still in an appendix - but with two significant changes. First, the footnote that shows that MV = PQ is a truism defining V is supplemented by a paragraph stating: "More important than the tautological equation of exchange is the quantity-theory hypothesis. Economists repeatedly kill it off. But it keeps coming back to life! This is not, I believe, an accident. For so long as paper money is valued only for the exchanges it helps make, doubling M can result in exactly the same 'real' equilibrium but with all P's doubled" (1958, p. 283, n. 1, italics in original). Second, the concluding footnote to the appendix recognizes the theoretical validity of the argument that in an economy with perfectly flexible prices, a continuous decline in prices can in principle generate full employment by means of the Pigou effect. Indeed, Samuelson presents this as a particular instance of the fact that "recent discussions have greatly reduced the area of disagreement between the various differing theories", while at the same time stressing that even Pigou did not recommend such a deflation as a means of actual policy (1958, p. 286, n. 1).

But a far more significant innovation of the fourth edition is the inclusion of a specific chapter devoted to a "Synthesis of Monetary Analysis and Income Analysis". Even here, however, the efficacy of an expansionary monetary policy (via its effect on the rate of interest) in stimulating investment demand in times of deep depression is considered limited, with reference again being made to the depression of the 1930s (1958, pp. 332-335). Neverthe-

less the chapter concludes with the statement that monetary policy has a role to play in achieving full employment in the economy (1958, pp. 340-41, 360). And a chapter with this title and this message is a standard feature of all subsequent editions of Economics.

In the fifth (1961) and later editions, the quantity theory returns to the text in a chapter entitled 'Prices and Money" and the discussion of the Pigou effect (in an expanded form) is shifted to an appendix to the chapter on the "Synthesis of Monetary Analysis and Income Analysis". At the same time the discussion of the aforementioned "two inadequacies of the quantity theory" is deleted. An undoubtedly related change is the introduction of a discussion of Milton Friedman's "sophisticated quantity theory", which contends that though V is not constant, "changes in V will either be so small or so predictable as to make one confident that dollar NNP will move in the same direction as M" (1961, p. 316). Samuelson goes on to say that "qualitatively, this is in agreement with almost any modern theory of income determination, and the only possible field for argument concerns the confidence with which one can predict the quantitative regularity of effects on NNP of changes in M" (ibid).

Similarly, the chapter on the neoclassical synthesis in the fifth edition gives more weight than before to the role of monetary policy. Indeed, it concludes with the summary statements that "monetary policy by the central bank is an important way of shifting the saving and investment schedules, or the total schedule of consumption-plus-investment-plus-government spending"; and though at times

of deep depression monetary policy may be of limited potency, "if stabilization policies are followed resolutely, such times should occur rarely" (1961, pp. 375-76). In the appendix to this chapter Samuelson goes on to emphasize that "there is no need to be dogmatic" about the relative advantages of the MV and C+I+G approaches, and that though the "bulk of economists" is inclined towards the latter approach,"if the day ever arrives when proponents of the velocity approach can prove by their researches that theirs is the more convenient tool, pragmatic scholars will welcome all the help it can give" (1961, p. 380). And from the eighth edition (1970) onwards this sentence is followed by one which reads, "In any case, post-Keynesian and monetarists both agree that money matters much" (1970, p. 325). Correspondingly, beginning with the seventh (1967) edition we find a criticism of the "Radcliffe /Committee's/ non-sequitur: 'Money alone matters' is false; ergo 'money doesn't matter'" (1967, p. 272, n. 13).

From the eighth edition (1970) onwards we also find an explicit discussion of monetarism, identified (of course) with Milton Friedman and described as an "extreme view" which contends "that essentially everything that can be done to control macroeconomic aggregates - inflationary gaps and epochs of depression or slow growth - has to be done by control of the money supply alone. Fiscal policy .... per se has essentially no predictable effect on the prospects for inflation or deflation, for high employment or mass unemployment" (1970, p. 309, italics in original). This view is contrasted with that of the "eclectic majority"

(which in subsequent editions Samuelson terms "the majority eclectic view of the so-called 'post-Keynesian neo-classical synthesis'" /1973, p. 329; 1976, p. 331; 1980, p. 309/ that "both fiscal and monetary policies matter much" (1970, p. 309, italics in original). Samuelson also makes it clear that he sees himself as part of this majority, and that when monetarism differs from this majority view, it is "wrong" (1970, p. 309) or "implausible" (1973, p. 329; 1976, p. 331). And though somewhat less explicit, this is also his view in the eleventh and latest edition (1980, p. 310). Indeed, in this edition, Samuelson adds to the aforementioned fallacy of the Radcliffe Committee, the "over-zealous monetarists' reverse fallacy: 'Money does matter; ergo money alone matters'" (1980, p. 270, n. 12, italics in original).

This then is the evolution of the treatment of monetary economics in Samuelson's Economics. It is not at all surprising that an introductory textbook should over the past thirty odd years reflect the increasing influence of monetarism in the profession and accordingly the analytical role of M as contrasted with that of C + I + G. In Paul's words in the tenth edition, "Economics is not an exact science ... Therefore an author should present in his book a framework of analysis that can be shaded in favor of either of these two scientifically proposed models. This text has been written to make this possible" (1976, p. 331). And again in the eleventh edition, "The good author, I believe, owes the reader a fair account of the opposing contentions" (1980, p. 310). But the foregoing survey has also shown that Paul's shift toward greater emphasis on monetary factors began to

take place in the mid-1950s, well before the growing influence of monetarism had manifested itself. And, as we have seen, this shift was stimulated first by Paul's own observations of the current economic scene and subsequently by the studies of others as well. This too is the mark of Paul Samuelson: a mind free of doctrinairism and open to new ideas and evidence.

FOOTNOTES

1. Including Marget's (1931, 1935) well- known discussion of Walras' monetary theory. Marget (1931, pp. 591-92; 1935, pp. 156-57) did however refer in a general way to Walras' earlier (and different) application of utility theory to money. And though Leser's analysis of the demand for money (1943) - referred to on p. 122, n. 21 of the Foundations - is based on a Walrasian utility function, it made no reference to Walras' work itself.

2. Cf., e.g., Lucas (1972), Grandmont and Laroque (1973), Barro and Grossman (1976), Grandmont (1980), and the articles in Kareken and Wallace (1980); see also the bibliography at end of the latter.

3. Under this general heading I include (e.g.) the approach that attributes to money utility (or considers it as a factor of production) by virtue of the time and effort that it saves as contrasted with barter transactions; the Baumol-Tobin inventory-theoretic approach; the Tobin risk-aversion approach; my own stochastic-payment approach; and the like.

4. Having referred to this article, I would like to note that the existence in it of a positive rate of interest in the case of a growing economy is not as paradoxical as Samuelson implies. For though the per capita income of the representative man remains constant in it, the total income of economy which he represents is increasing. Hence the exist-

ence of interest in this economy can essentially be considered as an instance of Böhm-Bawerk's first cause of interest: namely, an increasing level of income /¯1958, I, 21, p. 469_/.

5. Whose subtitle for some reason disappeared after the seventh (1967) edition.

6. This was pointed out by Bishop (1948),p. 325, n. 6. There is, however, one difference between the diagram on p. 1115 of Samuelson's 1939 article and the usual diagonal-cross diagram: in particular, Samuelson's analysis is of an economy in stationary equilibrium, in which by definition there is no net investment; correspondingly, this diagram contains only a consumption function, and not one reflecting the aggregate of consumption and investment expenditures.

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